

**PART 435—ENERGY EFFICIENCY
STANDARDS FOR NEW FEDERAL
LOW-RISE RESIDENTIAL BUILD-
INGS**

**Subpart A—Mandatory Energy Efficiency
Standards for Federal Low-Rise Resi-
dential Buildings.**

Sec.

- 435.1 Purpose and scope.
- 435.2 Definitions.
- 435.3 Material incorporated by reference.
- 435.4 Energy efficiency performance stand-
ard.
- 435.5 Performance level determination.
- 435.6 Sustainable principles for siting, de-
sign and construction. [Reserved]
- 435.7 Water used to achieve energy effi-
ciency. [Reserved]
- 435.8 Life-cycle costing.

**Subpart B—Voluntary Performance Stand-
ards for New Non-Federal Residential
Buildings [Reserved]**

**Subpart C—Mandatory Energy Efficiency
Standards for Federal Residential Buildings**

- 435.300 Purpose.
- 435.301 Scope.
- 435.302 Definitions.
- 435.303 Requirements for the design of a
Federal residential building.
- 435.304 The COSTSAFR Program.
- 435.305 Alternative compliance procedure.
- 435.306 Selecting a life cycle effective pro-
posed building design.

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**Subpart A—Mandatory Energy Ef-
ficiency Standards for Federal
Low-Rise Residential Build-
ings.**

SOURCE: 71 FR 70283, Dec. 4, 2006.

§ 435.1 Purpose and scope.

This part establishes energy efficiency performance standard for the construction of new Federal low-rise residential buildings as required by section 305(a) of the Energy Conservation and Production Act, as amended (42 U.S.C. 6834(a)).

§ 435.2 Definitions.

For purposes of this part, the following terms, phrases and words shall be defined as follows:

Design for construction means the stage when the energy efficiency and sustainability details (such as insulation levels, HVAC systems, water-using systems, etc.) are either explicitly determined or implicitly included in a project cost specification.

DOE means U.S. Department of Energy.

Federal agency means any department, agency, corporation, or other entity or instrumentality of the executive branch of the Federal Government, including the United States Postal Service, the Federal National Mortgage Association, and the Federal Home Loan Mortgage Corporation.

ICC means International Code Council.

IECC means International Energy Conservation Code.

IECC Baseline Building 2004 means a building that is otherwise identical to the proposed building but is designed to meet, but not exceed, the energy efficiency specifications in the ICC International Energy Conservation Code, 2004 Supplement Edition, January 2005 (incorporated by reference, see § 435.3).

IECC Baseline Building 2009 means a building that is otherwise identical to the proposed building but is designed to meet, but not exceed, the energy efficiency specifications in the ICC International Energy Conservation Code, 2009 Edition, January 2009 (incorporated by reference, see § 435.3).

Life-cycle cost means the total cost related to energy conservation measures of owning, operating and maintaining a building over its useful life as determined in accordance with 10 CFR part 436.

Life-cycle cost-effective means that the proposed building has a lower life-cycle cost than the life-cycle costs of the baseline building, as described by 10 CFR 436.19, or has a positive estimated net savings, as described by 10 CFR 436.20, or has a savings-to-investment ratio estimated to be greater than one, as described by 10 CFR 436.21; or has an adjusted internal rate of return, as described by 10 CFR 436.22, that is estimated to be greater than the discount

Department of Energy

§ 435.4

rate as listed in OMB Circular Number A-94 “Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs.”

Low-rise residential building means any building three stories or less in height above grade that includes sleeping accommodations where the occupants are primarily permanent in nature (30 days or more).

New Federal building means any building to be constructed by, or for the use of, any Federal agency which is not legally subject to State or local building codes or similar requirements. A new building is a building constructed on a site that previously did not have a building or a complete replacement of an existing building from the foundation up.

Proposed building means the building design of a new Federal low-rise residential building proposed for construction.

[71 FR 70283, Dec. 4, 2006, as amended at 72 FR 72571, Dec. 21, 2007; 76 FR 49285, Aug. 10, 2011]

§ 435.3 Materials incorporated by reference.

(a) *General.* The Department of Energy incorporates by reference the energy performance standards listed in paragraph (b) of this section into 10 CFR part 435. The Director of the Federal Register has approved the material listed in paragraph (b) of this section for incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Any subsequent amendment to a standard by the standard-setting organization will not affect DOE regulations unless and until DOE amends its energy performance standards. Material is incorporated as it exists on the date of the approval, and a notice of any change in the material will be published in the FEDERAL REGISTER. All approved material is available for inspection at the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, Sixth Floor, 950 L’Enfant Plaza, SW., Washington, DC 20024, (202) 586-2945. Also, this material is available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at

NARA, call 202-741-6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

(b) ICC. International Code Council, 500 New Jersey Avenue, NW., 6th Floor, Washington, DC 20001, 1-888-ICC-SAFE or (202) 370-1800, or go to <http://www.iccsafe.org/Pages/default.aspx>.

(1) ICC International Energy Conservation Code (IECC), 2004 Supplement Edition (“IECC 2004”), January 2005, ISBN 7801S04, IBR approved for §§ 435.2, 435.4, 435.5;

(2) ICC International Energy Conservation Code (IECC), 2009 Edition (“IECC 2009”), January 2009, ISBN 978-1-58001-742-8, IBR approved for §§ 435.2, 435.4, 435.5.

[76 FR 49285, Aug. 10, 2011]

§ 435.4 Energy efficiency performance standard.

(a)(1) All Federal agencies shall design new Federal buildings that are low-rise residential buildings, for which design for construction began on or after January 3, 2007, but before August 10, 2012, to:

(i) Meet the IECC 2004 (incorporated by reference, see § 435.3), and

(ii) If life-cycle cost-effective, achieve energy consumption levels, calculated consistent with paragraph (b) of this section, that are at least 30 percent below the levels of the IECC Baseline Building 2004.

(2) All Federal agencies shall design new Federal buildings that are low-rise residential buildings, for which design for construction began on or after August 10, 2012, to:

(i) Meet the IECC 2009 (incorporated by reference, see § 435.3), and

(ii) If life-cycle cost-effective, achieve energy consumption levels, calculated consistent with paragraph (b) of this section, that are at least 30 percent below the levels of the IECC Baseline Building 2009.

(b) Energy consumption for the purposes of calculating the 30 percent savings shall include space heating, space cooling, and domestic water heating.

(c) If a 30 percent reduction is not life-cycle cost-effective, the design of the proposed building shall be modified so as to achieve an energy consumption level at or better than the maximum

§ 435.5

level of energy efficiency that is life-cycle cost-effective, but at a minimum complies with paragraph (a) of this section.

[71 FR 70283, Dec. 4, 2006, as amended at 72 FR 72571, Dec. 21, 2007; 76 FR 49285, Aug. 10, 2011]

§ 435.5 Performance level determination.

(a) For Federal buildings for which design for construction began on or after January 3, 2007, but before August 10, 2012, each Federal agency shall determine energy consumption levels for both the IECC Baseline Building 2004 and proposed building by using the Simulated Performance Alternative found in section 404 of the IECC 2004 (incorporated by reference, see § 435.3).

(b) For Federal buildings for which design for construction began on or after August 10, 2012, each Federal agency shall determine energy consumption levels for both the IECC Baseline Building 2009 and proposed building by using the Simulated Performance Alternative found in section 405 of the IECC 2009 (incorporated by reference, see § 435.3).

[76 FR 49285, Aug. 10, 2011]

§ 435.6 Sustainable principles for siting, design and construction. [Reserved]

§ 435.7 Water used to achieve energy efficiency. [Reserved]

§ 435.8 Life-cycle costing.

Each Federal agency shall determine life-cycle cost-effectiveness by using the procedures set out in subpart A of 10 CFR part 436. A Federal agency may choose to use any of four methods, including lower life-cycle costs, positive net savings, savings-to-investment ratio that is estimated to be greater than one, and an adjusted internal rate of return that is estimated to be greater than the discount rate as listed in OMB Circular Number A-94 "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs."

Subpart B—Voluntary Performance Standards for New Non-Federal Residential Buildings [Reserved]

10 CFR Ch. II (1–12 Edition)

Subpart C—Mandatory Energy Efficiency Standards for Federal Residential Buildings

§ 435.300 Purpose.

(a) This subpart establishes voluntary energy conservation performance standards for new residential buildings. The voluntary energy conservation performance standards are designed to achieve the maximum practicable improvements in energy efficiency and increases in the use of non-depletable sources of energy.

(b) Voluntary energy conservation performance standards prescribed under this subpart shall be developed solely as guidelines for the purpose of providing technical assistance for the design of energy conserving buildings, and shall be mandatory only for the Federal buildings for which design for construction began before January 3, 2007.

(c) The energy conservation performance standards will direct Federal policies and practices to ensure that cost-effective energy conservation features will be incorporated into the designs of all new Federal residential buildings for which design for construction began January 3, 2007.

[53 FR 32545, Aug. 25, 1988, as amended at 71 FR 70284, Dec. 4, 2006]

§ 435.301 Scope.

(a) The energy conservation performance standards in this subpart will apply to all Federal residential buildings for which design of construction began before January 3, 2007 except multifamily buildings more than three stories above grade.

(b) The primary types of buildings built by or for the Federal agencies, to which the energy conservation performance standards will apply, are:

- (1) Single-story single-family residences;
- (2) Split-level single-family residences;
- (3) Two-story single-family residences;
- (4) End-unit townhouses;
- (5) Middle-unit townhouses;
- (6) End-units in multifamily buildings (of three stories above grade or less);

Department of Energy

§ 435.302

(7) Middle-units in multifamily buildings (of three stories above grade or less);

(8) Single-section mobile homes; and

(9) Multi-section mobile homes.

[53 FR 32545, Aug. 25, 1988, as amended at 71 FR 70284, Dec. 4, 2006]

§ 435.302 Definitions.

(a) *ANSI* means American National Standards Institute.

(b) *ASHRAE Handbook* means American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., *ASHRAE Handbook*, 1985 Fundamentals. Volume, 1-P Edition.

(c) *ASTM* means American Society of Testing and Measurement.

(d) *British thermal unit (Btu)* means approximately the amount of heat required to raise the temperature of one pound of water from 59 °F to 60 °F.

(e) *Building* means any new residential structure:

(1) That includes or will include a heating or cooling system, or both, or a domestic hot water system, and

(2) For which a building design is created after the effective date of this rule.

(f) *Building design* means the development of plans and specifications for human living space.

(g) *Conservation Optimization Standard for Savings in Federal Residences* means the computerized calculation procedure that is used to establish an energy consumption goal for the design of Federal residential buildings.

(h) *COSTSAFR* means the Conservation Optimization Standard for Savings in Federal Residences.

(i) *DOE* means U.S. Department of Energy.

(j) *Domestic hot water (DHW)* means the supply of hot water for purposes other than space conditioning.

(k) *Energy conservation measure (ECM)* means a building material or component whose use will affect the energy consumed for space heating, space cooling, domestic hot water or refrigeration.

(l) *Energy performance standard* means an energy consumption goal or goals to be met without specification of the method, materials, and processes to be employed in achieving that goal or goals, but including statements of the

requirements, criteria evaluation methods to be used, and any necessary commentary.

(m) *Federal agency* means any department, agency, corporation, or other entity or instrumentality of the executive branch of the Federal Government, including the United States Postal Service, the Federal National Mortgage Association, and the Federal Home Loan Mortgage Corporation.

(n) *Federal residential building* means any residential building to be constructed by or for the use of any Federal agency in the Continental U.S., Alaska, or Hawaii that is not legally subject to state or local building codes or similar requirements.

(o) *Life cycle cost* means the minimum life cycle cost calculated by using a methodology specified in subpart A of 10 CFR part 436.

(p) *Point system* means the tables that display the effect of the set of energy conservation measures on the design energy consumption and energy costs of a residential building for a particular location, building type and fuel type.

(q) *Practicable optimum life cycle energy cost* means the energy costs of the set of conservation measures that has the minimum life cycle cost to the Federal government incurred during a 25 year period and including the costs of construction, maintenance, operation, and replacement.

(r) *Project* means the group of one or more Federal residential buildings to be built at a specific geographic location that are included by a Federal agency in specifications issued or used by a Federal agency for design or construction of the buildings.

(s) *Prototype* means a fundamental house design based on typical construction assumptions. The nine prototypes in *COSTSAFR* are: single-section manufactured house, double-section manufactured house, ranch-style house, two-story house, split-level house, mid-unit apartment, end-unit apartment, mid-unit townhouse, end-unit townhouse.

(t) *Residential building* means a new building that is designed to be constructed and developed for residential occupancy.

(u) *Set of conservation options* means the combination of envelope design and

§ 435.303

equipment measures that influences the long term energy use in a building designed to maintain a minimum of ventilation level of 0.7 air changes per hour, including the heating and cooling equipment, domestic hot water equipment, glazing, insulation, refrigerators and air infiltration control measures.

(v) *Shading coefficient* means the ratio of the heat gains through windows, with or without integral shading devices, to that occurring through unshaded, 1/8-inch clear glass.

(w) *Total annual coil load* means the energy for space heating and/or cooling with no adjustment for HVAC equipment efficiency.

[56 FR 3772, Jan. 31, 1991]

§ 435.303 Requirements for the design of a Federal residential building.

(a) The head of each Federal agency responsible for the construction of Federal residential buildings shall establish an energy consumption goal for each residential building to be designed or constructed by or for the agency, for which design for construction began before January 3, 2007.

(b) The energy consumption goal for a Federal residential building for which design for construction began before January 3, 2007, shall be a total point score derived by using the micro-computer program and user manual entitled "Conservation Optimization Standard for Savings in Federal Residences (COSTSAFR)," unless the head of the Federal agency shall establish more stringent requirements for that agency.

(c) The head of each Federal agency shall adopt such procedures as may be necessary to ensure that the design of a Federal residential building is not less energy conserving than the energy consumption goal established for the building.

[53 FR 32545, Aug. 25, 1988, as amended at 71 FR 70284, Dec. 4, 2006]

§ 435.304 The COSTSAFR Program.

(a) The COSTSAFR Program (Version 3.0) provides a computerized calculation procedure to determine the most effective set of energy conservation measures, selected from among the measures included within the Pro-

10 CFR Ch. II (1-1-12 Edition)

gram that will produce the practicable optimum life cycle cost for a type of residential building in a specific geographic location. The most effective set of energy conservation measures is expressed as a total point score that serves as the energy consumption goal.

(b) The COSTSAFR Program (Version 3.0) also prints out a point system that identifies a wide array of different energy conservation measures indicating how many points various levels of each measure would contribute to reaching the total point score of the energy consumption goal. This enables a Federal agency to use the energy consumption goal and the point system in the design and procurement procedures so that designers and builders can pick and choose among different combinations of energy conservation measures to meet or exceed the total point score required to meet the energy consumption goal.

(c) The COSTSAFR Program (Version 3.0) operates on a micro-computer system that uses the MS DOS operating system and is equipped with an 8087 co-processor.

(d) The COSTSAFR Program (Version 3.0) may be obtained from:

National Technical Information Service; Department of Commerce; Springfield, Virginia 22161; (202) 487-4600

[53 FR 32545, Aug. 25, 1988, as amended at 56 FR 3772, Jan. 31, 1991]

§ 435.305 Alternative compliance procedure.

(a) If a proposed building design includes unusual or innovative energy conservation measures which are not covered by the COSTSAFR program, the Federal agency shall determine whether that design meets or exceeds the applicable energy consumption goal in compliance with the procedures set forth in this section.

(b) The Federal agency shall determine the estimated discounted energy cost for the COSTSAFR prototype building design, which is the most similar of the COSTSAFR prototypes to the proposed building design, by—

(1) Printing out the COSTSAFR compliance forms for the prototype showing the points attributable to levels of various energy conservation measures;

Department of Energy

§ 435.305

(2) Calculating the estimated unit energy cost on the compliance forms, on the basis of selecting the optimum levels on the compliance forms or otherwise in the User's Manual for each energy conservation measure; and

(3) Multiplying the estimated unit energy cost by 100.

(c) The Federal agency shall determine the estimated discounted energy cost for the proposed building design by—

(1) Estimating the heating and cooling total annual coil loads of the proposed building design with the DOE 2.1C computer program on the basis of input assumptions including—

(i) Shading coefficients of 0.6 for summer and 0.8 for winter;

(ii) Thermostat setpoints of 78 degrees Fahrenheit for cooling, 70 degrees Fahrenheit for heating (6 am to 12 midnight), and 60 degrees Fahrenheit for Night Setback (12 midnight to 6 am, except for houses with heat pumps);

(iii) The infiltration rate measured in air changes per hour as calculated using appendix B of the COSTSAFR User's Manual;

(iv) Natural venting with a constant air change rate of 10 air changes per hour—

(A) When the outdoor temperature is lower than the indoor temperature, but not above 78 degrees Fahrenheit; and

(B) When the enthalpy of the outdoor air is lower than the indoor air.

(v) Internal gains in accordance with the following table for a house with 1540 square feet of floor area, adjusted by 0.35 Btu/ft²/hr to account for changes in lighting as the floor area varies from 1540 square feet—

TABLE 1—INTERNAL GAIN SCHEDULE (BTU)

Hour of day	Sensible	Latent
1	1139	247

TABLE 1—INTERNAL GAIN SCHEDULE (BTU)—
Continued

Hour of day	Sensible	Latent
2	1139	247
3	1139	247
4	1139	247
5	1139	247
6	1903	412
7	2391	518
8	4782	1036
9	2790	604
10	1707	370
11	1707	370
12	2277	493
13	1707	370
14	1424	308
15	1480	321
16	1480	321
17	2164	469
18	2334	506
19	2505	543
20	3928	851
21	3928	851
22	4101	888
23	4101	888
24	3701	802

(vi) Thermal transmittances for building envelope materials measured in accordance with applicable ASTM procedures or from the ASHRAE Handbook;

(vii) Proposed heating and cooling equipment types included in COSTSAFR or having a certified seasonal efficiency rating;

(viii) Weather Year for Energy Calculations (WYEC) weather year data (WYEC data are on tapes available from ASHRAE, 1791 Tullie Circle, N.E., Atlanta, Georgia 30329), or if unavailable, Test Reference Year (TRY) weather data (obtainable from National Climatic Data Center, 1983 *Test Reference Year*, Tape Reference Manual, TD-9706, Asheville, North Carolina) relevant to project location.

(2) Estimating the discounted energy cost for the heating and cooling energy loads, respectively, according to the following equation—

$$\text{Discounted Energy Cost} = \frac{\text{Total Annual Coil Load} \times \text{Fuel Cost} \times \text{UPW}^*}{\text{Equipment Efficiency}}$$

Where:

Total Annual Coil Load=the total heating or cooling annual coil load calculated under paragraph (c)(1);

Fuel Cost=the heating or cooling fuel cost calculated in accordance with sections 3.3.D and 3.3.E of the User's Manual;

§ 435.306

UPW*=the uniform present worth discount factor; selected from the last page of the compliance forms.

Equipment Efficiency=the test seasonal efficiency rating of the heating and cooling equipment only (i.e., not including duct or distribution system losses).

10 CFR Ch. II (1–12 Edition)

(3) Estimating the discounted energy cost for water heating and refrigerator/freezer energy consumption—

(i) For equipment types covered by the COSTSAFR compliance forms, by multiplying the estimated unit energy cost by 100; or

(ii) For equipment types not covered by COSTSAFR—

$$\text{Discounted Energy Cost} = \frac{\text{Annual Energy Consumption} \times \text{Fuel Cost} \times \text{UPW}^*}{\text{Energy Factor}}$$

Where:

Fuel Cost and UPW* are as defined in paragraph (c)(2) of this section; Annual Energy Consumption is as calculated in 10 CFR 430.22; and Energy Factor is the measure of energy efficiency as calculated under 10 CFR 430.22

(iii) [Reserved]

(4) Adding together the discounted energy costs calculated under paragraphs (c)(2) and (c)(3) of this section;

(d) If the discounted energy cost of the proposed building design calculated under paragraph (c)(4) of this section is equal to or less than the discounted energy cost of the COSTSAFR prototype building design calculated under paragraph (b) of this section, then the proposed building design is in compliance with the applicable energy consumption goal under this part.

[56 FR 3772, Jan. 31, 1991]

§ 435.306 Selecting a life cycle effective proposed building design.

In selecting between or among proposed building designs which comply with the applicable energy consumption goal under this part, each Federal agency shall select the design which, in comparison to the applicable COSTSAFR prototype, has the highest Net Savings or lowest total life cycle costs calculated in compliance with subpart A of 10 CFR part 436.

[56 FR 3773, Jan. 31, 1991]

PART 436—FEDERAL ENERGY MANAGEMENT AND PLANNING PROGRAMS

Sec.

436.1 Scope.

436.2 General objectives.

Subpart A—Methodology and Procedures for Life Cycle Cost Analyses

436.10 Purpose.

436.11 Definitions.

436.12 Life cycle cost methodology.

436.13 Presuming cost-effectiveness results.

436.14 Methodological assumptions.

436.15 Formatting cost data.

436.16 Establishing non-fuel and non-water cost categories.

436.17 Establishing energy or water cost data.

436.18 Measuring cost-effectiveness.

436.19 Life cycle costs.

436.20 Net savings.

436.21 Savings-to-investment ratio.

436.22 Adjusted internal rate of return.

436.23 Estimated simple payback time.

436.24 Uncertainty analysis.

Subpart B—Methods and Procedures for Energy Savings Performance Contracting

436.30 Purpose and scope.

436.31 Definitions.

436.32 Qualified contractors lists.

436.33 Procedures and methods for contractor selection.

436.34 Multiyear contracts.

436.35 Standard terms and conditions.

436.36 Conditions of payment.

436.37 Annual energy audits.

436.38 Terminating contracts.

Subpart C—Agency Procurement of Energy Efficient Products

436.40 Purpose and scope.